CITY OF KUNA (PWS 4010085)
SOURCE WATER ASSESSMENT FINAL REPORT

January 22, 2002

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the Act. This assessment is based on a land use inventory of the designated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

This report, *Source Water Assessment for City of Kuna, Idaho*, describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The City of Kuna drinking water system consists of three wells. Well #3 (the Butler Well) has a high susceptibility to inorganic, volatile organic, and synthetic organic contaminants, and it has a moderate susceptibility to microbial contaminants. Well #4 (the Cedar Well) has a moderate susceptibility to inorganic, volatile organic, synthetic organic, and microbial contaminants. Well #5 has a high susceptibility to all potential contaminant categories due to the location of a road that passes within 50 feet of the wellhead. Well #5 also has hydrogen sulfide concentrations above the maximum contaminant level (MCL), giving an automatic high susceptibility score to inorganic contaminants (IOC). The high susceptibility score of Well #3 reflects that well's high hydrologic sensitivity score and the moderate system construction score as well as the predominant irrigated agricultural land use.

Current water chemistry issues of the Kuna wells pertain to high concentrations of arsenic and hydrogen sulfide. Arsenic has been detected above the recently revised MCL of 10 micrograms per liter (μg/L) in Well #4. It has also been detected in Well #3 at levels greater than one-half the revised MCL. The MCL was recently lowered from 50 μg/L to 10 μg/L. However, the Environmental Protection Agency (EPA) has given public water systems until 2006 to come in to compliance with the new standard. Hydrogen sulfide was detected above the MCL in Well #5. Though this is not a primary contaminant, the EPA regulates it due to its associated health risks.

None of the wells has recorded the presence of synthetic organic contamination (SOC). However, the area surrounding the wells is classified as a priority area for the pesticides atrazine and alachlor. The volatile organic contaminants (VOCs), trihalomethanes, were detected in Well #3 in December 1998. The trihalomethanes (bromodichloromethane, bromoform, and chlordibromomethane) were most likely disinfection biproducts. The IOCs barium, chromium, and fluoride have also been detected, but at levels below the current MCLs. Well #4 and Well #5 have detected nitrate at levels below the MCL. Total coliform bacteria were detected in the distribution system in October 1992 and again in September 1998. Table 1 in Section 2 summarizes the contaminants detected in each well.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

For the City of Kuna, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). Due to the arsenic and hydrogen sulfide concentrations, the City of Kuna may want to consider the implementation of engineering controls to protect the drinking water. With the change in the arsenic standard, the EPA intends to have funds available for small communities to assist in updating their systems to comply with the new arsenic standard. See www.epa.gov for more information concerning the new arsenic standard. No application or storage of herbicides, pesticides, or other chemicals is allowed within 50 feet of a public water system well. Limiting the use of the road that passes within 50 feet of Well #5 may need to be considered to avoid contamination from chemical spills or releases occurring on the road. If microbial contamination becomes a problem, appropriate disinfection practices would need to be maintained for the system. Furthermore, the disinfection system should be modified and monitored to avoid further detections of VOCs in the drinking water. Though water cannot be totally free of by-products when disinfection is used, they can be reduced by treatment modifications. To reduce the amount of trihalomethanes detected in the water system, EPA suggests moving the point of chlorination after the coagulation and settling steps of the treatment train to reduce the amount of natural organic matter (NOM). Other factors that affect the formation of by-products are pH, temperature, and dose of disinfection. For more control strategies and disinfection by-products information, see www.epa.gov/safewater/mdbp/pdf/alter/chapt_2.pdf. Since the delineations underlie urban and residential land, storm water drainage may be a consideration. Much of the designated protection areas are outside the direct jurisdiction of the City of Kuna, making collaboration and partnerships with state and local agencies and industry groups critical to the success of drinking water protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineations contain some urban and residential land uses. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the U.S. Environmental Protection Agency. As there are major transportation corridors through the delineations, the Idaho Department of Transportation should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the Ada Soil and Water Conservation District, and the Natural Resources Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Boise Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR CITY OF KUNA, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the rankings of this assessment mean.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are included. The list of significant potential contaminant source categories and their rankings used to develop the assessment are also included.

Background

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

Level of Accuracy and Purpose of the Assessment

Since there are over 2,900 public water sources in Idaho, there is limited time and resources to accomplish the assessments. All assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a drinking water protection program should be determined by the local community based on its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The public drinking water system for the City of Kuna is comprised of three ground water wells that serve approximately 4,590 people through 1,700 connections. The wells are located in Ada County within the City of Kuna (Figure 1). Well #3 is located on the north side of the city near the water tank. It is approximately one-half mile north of Indian Creek. Well #4 is located on the southwest side of Kuna approximately 600 feet north of Highway 69, 300 feet north of Owyhee Street, and 300 feet south of Indian Creek. Well #5 is located within the Discovery Creek Subdivision on the west side of Kuna. It is about 300 feet east of Indian Creek and approximately one-half mile north of Highway 69. Water is stored in a 500,000-gallon storage tank at each well. Gaseous chlorine disinfection is used.

Current water chemistry issues of the Kuna wells pertain to elevated concentrations of arsenic and hydrogen sulfide. Arsenic has been detected above the current MCL of 10 µg/L in Well #4. In December 1998, it was detected at 18 µg/L and at 12 µg/L in October 2001. Arsenic has also been detected in Well #3 at 6 µg/L in December 1998, a level greater than one-half the revised MCL. The MCL has recently been lowered from 50 µg/L to 10 µg/L. However, the EPA has given public water systems until 2006 to come into compliance with the new standard. Hydrogen sulfide was detected above the MCL in Well #5. Though this is not a primary contaminant, the EPA regulates it due to its associated health risks.

None of the wells has recorded the presence of SOCs. However, the area surrounding the wells is classified as a priority area for the pesticides atrazine and alachlor. TheVOCs, trihalomethanes, were detected in Well #3 in December 1998. The trihalomethanes (bromodichloromethane, bromoform, and chlordibromomethane) were most likely disinfection biproducts. The IOCs barium, chromium, and fluoride have been detected, but at levels below the current MCLs. Well #4 and Well #5 have detections of nitrate at levels below the MCL. Total coliform bacteria were detected in the distribution system in October 1992 and again in September 1998. Table 1 below summarizes the contaminants detected in each well.

Table 1. Detection Summary of Contaminants in the City of Kuna wells.

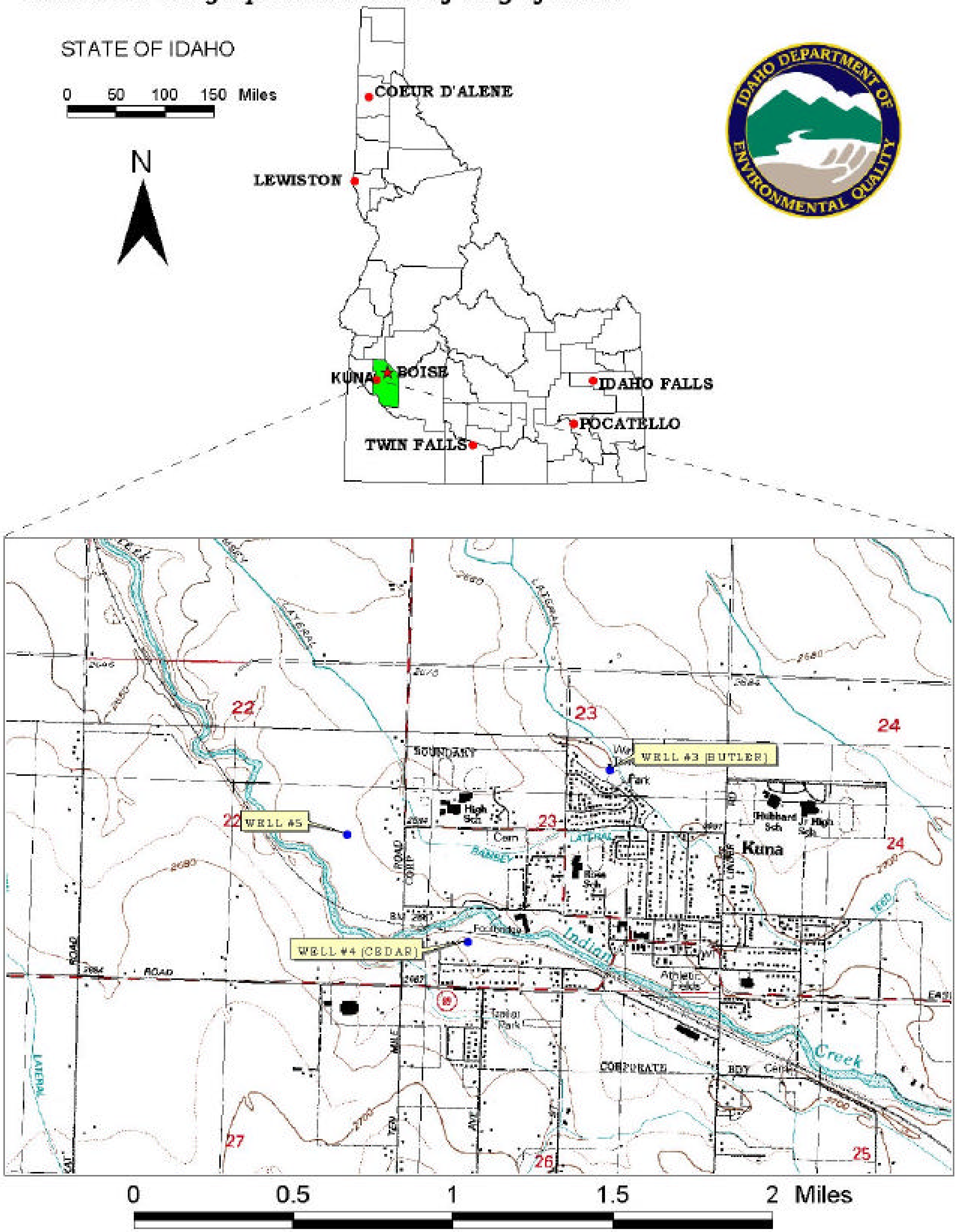
Well	Arsenic (MCL = 10 µg/L)	Nitrate (MCL = 10 mg/L)	Fluoride	Barium	Chromium	VOCs	Hydrogen Sulfide (MCL = 0.05 ppm)
Well #3	6	---		---	---	Trihalomethanes	---
Well #4	18	<1		---		---	---
Well #5	---	<2.6				---	0.22

MCL = maximum contaminant level; ppb = parts per billion; µg/L = micrograms per liter; mg/L = milligrams per liter; = Detected in the well

Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ contracted with BARR Engineering to perform the delineations using a combination of MODFLOW and a refined analytical element computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water

FIGURE 1. Geographic Location of City of Kuna



associated with the Boise Valley aquifer in the vicinity of the City of Kuna. The computer models used site specific data, assimilated by BARR Engineering from a variety of sources including the City of Kuna well logs, other local area well logs, the Treasure Valley Hydrologic Project, and hydrogeologic reports (detailed below).

Treasure Valley Hydrologic Project Information (Petrich and Urban, 1996; Neely and Crockett, 1998; Petrich et al., 1999)

The "Treasure Valley" is a geopolitical region that includes the lower Boise River sub-basin. The lower Boise River sub-basin begins where the Boise River exits the mountains near the Lucky Peak Reservoir. From Lucky Peak Dam the lower Boise River flows about 64 (river) miles northwestward through the Treasure Valley to its confluence with the Snake River. The Treasure Valley Hydrologic Project area encompasses the lower Boise River area, and extends south to the Snake River. The southern area is included in the study area because of ground water flow from the Lower Boise River basin south toward the Snake River.

Significant amounts of desert area were converted to flood irrigated agriculture beginning in the 1860s. Irrigation led to increases in shallow ground water levels in some areas. The shallow ground water levels provided an inexpensive and readily obtainable water supply that is used extensively throughout the valley. Much of the population growth in the Treasure Valley has been occurring in previously flood-irrigated agricultural areas, resulting in increased pumpage and a reduction in local aquifer recharge. In addition, irrigation in some areas has become more efficient, reducing the amount of irrigation-related infiltration. Decreasing aquifer recharge and increasing pumpage is thought to be contributing to decreasing ground water levels in some areas.

The Treasure Valley experiences a temperate and arid-to-semiarid climate. Average high temperatures range from about 90°F in summer to 36°F in winter; low temperatures range from about 20°F in winter to about 56°F in summer. The average precipitation ranges from about 8 to 14 inches throughout most of the valley, most of which falls during the colder months.

Major surface water bodies include the Boise River, Lake Lowell, and Lucky Peak Reservoir. The primary source of surface water in the Treasure Valley is precipitation falling in the high elevation area in the Boise River basin upstream of Lucky Peak Dam. Much of the runoff from high elevation areas is stored in three reservoirs: Anderson Ranch Reservoir, Arrowrock Reservoir, and Lucky Peak Reservoir.

The region's croplands are irrigated primarily with surface water through an extensive network of reservoirs and canals. The first canals were constructed in the 1860's; there are now over 1,100 miles of major and intermediate canals in the Treasure Valley. The primary sources of the irrigation water in the Treasure Valley include the Boise, Snake, and Payette Rivers. The majority of canals are owned and maintained by canal companies and irrigation districts.

Hydrogeology (from Petrich et al., 1999)

The lower Boise River sub-basin (Treasure Valley) is located within the northwest-trending topographic depression known as the western Snake River Plain. The western Snake River Plain is a relatively flat lowland separating Cretaceous granitic mountains of west-central Idaho from the granitic/volcanic Owyhee mountains in southwestern Idaho. The western Snake River Plain extends from about Twin Falls, Idaho northwestward to Vale, Oregon. The Snake River Plain is about 30 miles wide in the section containing the lower Boise River.

Sediments originating from the surrounding mountains began accumulating on top of thick, basal basalts. Rifting and continued subsidence maintained the lowland topography, leading to the additional accumulation of water and sediments (Othberg, 1994). Basin infilling by sediments and basalt occurred from the late Miocene through the late Pliocene (Othberg, 1994). Incision caused by flowing water in major drainages (e.g., Snake and Boise Rivers) began in the late Pliocene or early Pleistocene, although deposition of coarse sediments continued during Quaternary glaciations (Othberg, 1994).

Several Quaternary basalt flows have been described in the western Snake River Plain, and have been assigned to the upper Snake River Group (Malde, 1991; Malde and Powers, 1962). Lava flowed across portions of the ancestral Snake River Valley (Malde, 1991) in an area that is now south of the Boise River. The Snake River then changed course, incising at its present location along the southern margin of the basalt flows. More recent eruptions (from Kuna Butte and other local sources) spilled lava into the canyon south of Melba. The Snake River has since incised this basalt (Malde, 1991).

The general stratigraphy of the western Snake River Plain consists of (from top to bottom) a thick layer of sedimentary deposits underlain by a thick series of basalt flows, which in turn are underlain by older, tuffaceous sediments and basalt (Malde, 1991; Clemens, 1993). The upper thick zone of sediments (up to approximately 6,000 feet thick) distinguishes the western Snake River Plain from the eastern Snake River Plain, in which the upper section is primarily Quaternary basalt (Wood and Anderson, 1981).

The uppermost sediments and basalt belong to the Pleistocene-age Snake River Group. The Snake River Group consists of terrace sediments, Quaternary alluvium, and Pleistocene basalt flows (Wood and Anderson, 1981). Snake River Group sediments and basalts cover much of the project area (Othberg and Stanford, 1992).

The Snake River Group overlies the Idaho Group sediments. The Idaho Group sediments can be divided into two general parts (Wood and Anderson, 1981). The lower Idaho Group contains sediments described as lake and stream deposits of buff white, brown, and gray sand, silt, clay, diatomite, numerous thin beds of vitric ash, and some basaltic tuffs. The upper part of the lower Idaho Group also contains some local, thin, basalt flows. The upper Idaho Group consists of sands, claystones, and siltstones, but differs from the lower Idaho Group in that it contains a greater percentage of coarser-grained materials. The upper Idaho Group are associated with a fluvial/deltaic/lacustrine depositional environment; the lower Idaho Group sediments were deposited in more of a lacustrine/deltaic environment (Wood, 1994).

Wood (1994) identified a buried lacustrine delta within the Idaho Group sediments in the Nampa-Caldwell area. The location of the delta in the middle of the western Snake River Plain suggests that the eastern part of the Boise River basin was delta plain and flood plain at the time of deposition, while the western part was a deep lake environment. The delta probably prograded northwestward into a lake basin 830 feet deep, based upon high resolution seismic reflection data and resistivity log interpretations. The delta-plain and front sediments were shown to be mostly fine-grained, well-sorted sand with thin layers of mud (Wood, 1994). The northwest trend of the delta indicates a sediment source to the southeast, such as where the Snake River flows today (Wood, 1994).

A substantial, laterally extensive layer of clay is found at depths of 300 to 700 feet below ground surface. The clay is important because it represents, in some areas, a significant aquitard separating shallow overlying aquifers from deeper zones. The clay, often described in well logs as having a blue or gray color, has been observed as far west as Parma, and as far east as Boise (although the clay is not found in the extreme eastern portions of the Treasure Valley). The clay varies from a few feet to a few hundred feet in thickness. Although significant layers of clay are present throughout the Idaho Group sediments, individual clay units are not necessarily continuous over large areas. Also, the top of the clay can vary in elevation by up to approximately 200 feet in some locations, such as in an area west of Lake Lowell. In general, sediments above the "blue clay" are coarser-grained than the interbedded sands, silts, and clays underlying the "blue clay."

The top of the upper Idaho Group is marked in several parts of the Treasure Valley by a widespread fluvial gravel deposit known as the Tenmile Gravels. Tenmile Gravels contain rounded granitic rocks and felsic porphyries originating from the Idaho Batholith to the north and northeast. The Tenmile Gravels range up to 500 feet in thickness along the Tenmile Ridge south of Boise, but are less than 50 feet thick in the Nampa-Caldwell area (Wood and Anderson, 1981).

Aquifer Systems and Hydrogeologic Characteristics

Ground water for municipal, industrial, rural domestic, and irrigation uses in the Treasure Valley is drawn almost entirely from Snake River Group and Idaho Group aquifers. Many domestic wells draw water from shallow aquifers, such as those in the Snake River Group deposits. Larger production wells (for municipal and agricultural uses) draw water from the deeper Idaho Group sediments.

Aquifers contained in the Snake River and Idaho Group sediments comprise shallow and regional ground water flow systems. Shallow aquifers contained in Snake River Group sediments and basalts may belong to local flow systems. Most local flow system recharge stems from irrigation infiltration and channel (e.g., streams or canals) losses. Discharge from shallow, local flow systems often is to local drains or streams. The time from recharge to discharge in shallow flow systems (residence times) probably ranges from days to tens of years.

In contrast, regional ground water flow systems extend much deeper than local flow systems. The Treasure Valley regional flow system begins in the eastern part of the valley, as indicated by downward hydraulic gradients in the Boise Fan sediments described by (Squires et al., 1992). Some water also enters the regional flow system as underflow from the Boise Foothills in the northeastern part of the valley. The regional flow system is thought to discharge primarily to the Boise and Snake Rivers in the western and southwestern parts of the valley.

Aquifer material characteristics, material heterogeneity, and structural controls influence Treasure Valley ground water flow. Coarse-grained materials (e.g., sand and gravel) in upper zones are more capable of transmitting ground water than fine-grained sediments (e.g., silt and clay). Clay and silt in the Snake River sediments can restrict vertical and/or horizontal ground water movement. Perched aquifers are created when fine-grained lenses impede downward vertical flow. A distinctive clay layer, sometimes referred to as "blue clay," is present over large portions of the valley. The clay is absent in the easternmost portions of the lower Boise River Basin, but can reach a thickness of more than 200 feet toward the central and western portions of the basin.

Sequences of interbedded sand, silt, and clay, such as the Deer Flat Surface and the upper portion of the Glenns Ferry Formation of the upper Idaho Group in the Nampa-Caldwell area, are the major water-producing aquifers in a large part of Canyon County (Anderson and Wood, 1981). The coarse-grained sediments in this zone produce water in excess of 2,000 gallons per minute (gpm).
The delineated source water assessment areas for the City of Kuna wells can best be described as north eastward trending corridors approximately 2.5 miles long and one-fourth mile wide (Figures 2, 3, and 4 in Appendix A) that cross Highway 69 (Meridian Road) to the east of Kuna. The actual data used by BARR Engineering in determining the source water assessment delineation areas are available from DEQ upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

Land use within the immediate area of the City of Kuna wellheads consists of residential (Well #5) and urban (Well #3 and Well #4), while the surrounding area is predominantly irrigated agriculture.

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in October and November 2001. The first phase involved identifying and documenting potential contaminant sources within the City of Kuna source water assessment areas (Figures 2, 3, and 4 in Appendix A) through the use of computer databases and Geographic Information System maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the area.

All of the delineated source water areas include Highway 69 (Meridian Road) as a potential source of contamination. This major transportation corridor could potentially contaminate the aquifer with leachates from accidental spills or releases. The delineation for Well #3 additionally includes a leaking underground storage tank (LUST) and an underground storage tank (UST). The delineation for Well #4 includes a UST, a Comprehensive Environmental Response Compensation and Liability Information Act (CERCLA) site as well as Indian Creek. Well #5 includes Ten Mile Road, another major transportation corridor (Tables 2, 3, and 4 in Appendix A). A spill occurring at any of these sites could contribute IOCs, VOCs, SOCs, and microbial contamination to the aquifer. Additionally, the 1994 Ground Water Under Direct Influence (GWUDI) field survey for Well #3 shows that a irrigation canal lies within 200 feet of the wellhead. The 2001 GWUDI for Well #5 shows that a road passes less than 50 feet from the wellhead. Though these sources shown by the GWUDI are not included in the potential contaminant inventory tables, they were used in assessing the susceptibility of the wells.

Section 3. Susceptibility Analyses

Each well's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Appendix B contains the susceptibility analysis worksheets. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity rating of a well is dependent upon four factors: the surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

Hydrologic sensitivity is high for Well #3 and moderate for Wells #4 and #5 (Table 6). Regional soils data indicate that the area is predominantly composed of moderate to well-drained soils. The well logs indicate that the vadose zones for all of the wells are composed predominantly of gravels and sands. However, a cumulative 50-foot thick fine-grained geologic zone above the producing interval was present in both Well #4 and Well #5. First ground water was located at approximately 83 feet for Wells #3, 75 feet for Well #5, and at approximately 92 feet for Well #4.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced. A sanitary survey was conducted in 1994. Table 4 summarizes the construction for each City of Kuna well.

All wells have a moderate system construction score. The static water table is located at about 83 feet below ground surface (bgs) for Well #3, 92 feet bgs for Well #4, and 75 feet bgs for Well #5. The 1997 sanitary survey indicates that wellhead and surface seals meet standards and all wells are properly protected from surface flooding. The following paragraphs describe the construction of each well.

Well #3, drilled in 1976 to a depth of 472 feet bgs, has 0.375-inch thick, 16-inch casing set to 317 feet bgs into “sticky blue clay.” It has a 0.312-inch thick, 10-inch intermittently screened casing from 296 to 471 feet bgs into “sand.” The annular seal was installed to a depth of 35 feet bgs into “gray basalt.” The well is intermittently screened from 300 to 371 feet bgs.

Well #4, drilled in 1993 to a depth of 487 feet bgs, has 0.375-inch thick, 18-inch casing set to 344 feet bgs into “fine sand and streaks of tan clay.” The annular seal was installed to a depth of 110 feet bgs into “sand and gravel.” The well is screened from 320 to 500 feet bgs.

Well #5, drilled in 1998 to a depth of 503 feet bgs, has 0.375-inch thick, 20-inch casing set to 346 feet bgs into “sand” followed by a 0.365-inch thick, 10-inch casing set from 296 to 486 feet bgs. The 10-inch casing is screened intermittently from 346 to 475 feet bgs. The annular seal was installed to a depth of 75 feet bgs into “basalt” using bentonite chips and from 294 to 503 feet bgs into “green clay” using Colorado Sand.

The available well logs allowed a determination as to whether current public water system (PWS) construction standards are being met. Though the wells may have been in compliance with standards when they were completed, current PWS well construction standards are more stringent. The Idaho Department of Water Resources *Well Construction Standards Rules* (1993) require all PWSs to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. Some of the regulations deal with screening requirements, aquifer pump tests, surface casing vent, and thickness of casing. Table 1 of the *Recommended Standards for Water Works* (1997) lists the required steel casing thickness for various diameter wells. Twelve-inch diameter wells require a casing thickness of 0.375-inches and ten-inch diameter wells require a casing thickness of 0.365-inches. The wells were assessed an additional point in the system construction rating even though they may have met standards at the time of installation.

Table 5. City of Kuna Well Construction Summary Information

Well	Well Depth (ft)	Water Table Depth (ft)	Casing: diameter/ thickness (in)	Casing: depth (ft)/ formation	Surface seal: depth (ft)/ formation	Screened Interval (ft)	Drill Year	Sanitary Survey Elements (A/B) [1]
Well #3	472	83	16/0.375 10/0.312	317/Sticky blue clay; 471/Sand	35/Gray basalt	300 to 471	1976	Yes/Yes
Well #4	487	94	18/0.375	344/Fine sand, streaks of tan clay	110/Sand and gravel	320 to 500	1993	Yes/Yes
Well #5	503	75	20/0.375 10/0.365	346/Sand; 487/Fine sand and clay streaks	75/Basalt; 294 to 503/Green clay	346 to 475	1998	Yes/Yes

[1] A = Well and surface seal in compliance; B = Protected from surface flooding
NI = no information was available

Potential Contaminant Source and Land Use

All wells rate moderate for IOCs (i.e. nitrates, arsenic), VOCs (i.e. petroleum products), and SOCs (i.e. pesticides) and all wells rate low for microbial contaminants (i.e. bacteria). The limited number of potential contaminant sources within the delineations contributed to the lower overall rating. However, agricultural land use surrounding the wells and the pesticide priority area that crosses the delineations contributed to the final ratings.

Final Susceptibility Ranking

A detection above a drinking water standard MCL, any detection of a VOC or SOC, or a detection of total coliform bacteria or fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well despite the land use of the area because a pathway for contamination already exists. Additionally, storing potential contaminant sources within 50 feet of a wellhead will automatically lead to a high susceptibility rating. In this case, the 2001 GWUDI for Well #5 indicates the presence of a road within 50 feet, giving automatic high scores for all potential contaminant categories. Additionally, hydrogen sulfide was detected at levels greater than the MCL, giving an automatic high susceptibility score to IOCs. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0- to 3-year time of travel zone (Zone 1B) and agricultural land contribute greatly to the overall ranking. In terms of total susceptibility, Well #3 rates high for IOCs, VOCs, and SOCs and it rates moderate for microbial contaminants. Well #4 rates moderate and Well #5 rates high for all potential contaminant categories.

Table 6. Summary of City of Kuna Susceptibility Evaluation.

Well	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	**Final Susceptibility Ranking**			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #3	H	M	M	M	L	M	H	H	H	M
Well #4	M	M	M	M	L	M	M	M	M	M
Well #5	M	M	M	M	L	M	H*	H*	H*	H*

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
*** = Automatic high score due to the proximity of a road within 50 feet of the wellhead**

Susceptibility Summary

Well #3 rated high susceptibility for IOCs, VOCs, and SOCs and rated moderate for microbial contaminants. Well #4 rated moderate for all potential contaminant categories. Well #5 rated automatically high for all potential contaminant categories due to a road that passes within 50 feet of the wellhead. The high hydrologic sensitivity score contributed greatly to the high susceptibility scores for Well #3. The agricultural land use surrounding the City of Kuna wells also contributed to the final susceptibility ratings.

Current water chemistry issues of the Kuna wells pertain to elevated concentrations of arsenic and hydrogen sulfide. Arsenic has been detected above the recently revised MCL of 10 µg/L in Well #4. In December 1998, it was detected at 18 µg/L and at 12 µg/L in October 2001. Arsenic has also been detected in Well #3 at 6 µg/L in December 1998, a level greater than one-half the revised MCL. In October 2001, the EPA lowered the arsenic MCL from 50 µg/L to 10 µg/L. However, public water systems have until 2006 to meet the new requirement. Hydrogen sulfide was detected above the MCL in Well #5. Though this is not a primary contaminant, the EPA regulates it due to its associated health risks.

None of the wells has recorded the presence of SOCs. However, the area surrounding the wells is classified as a priority area for the pesticides atrazine and alachlor. TheVOCs, trihalomethanes, were detected in Well #3 in December 1998. The trihalomethanes (bromodichloromethane, bromoform, and chlordibromomethane) were most likely disinfection biproducts. The IOCs barium, chromium, and fluoride have been detected, but at levels below the current MCLs set by the EPA. Well #4 and Well #5 have detections of nitrate at levels below the MCL. Total coliform bacteria were detected in the distribution system in October 1992 and September 1998. Table 1 in Section 2 summarizes the contaminants detected in each well.

Section 4. Options for Drinking Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed drinking water protection program will incorporate many strategies. For the City of Kuna, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). Due to the arsenic and hydrogen sulfide concentrations, the City of Kuna may want to consider the implementation of engineering controls to protect the drinking water. With the change in the arsenic standard, the EPA intends to have funds available for small communities to assist in updating their systems to comply with the new arsenic standard. See www.epa.gov for more information on the new arsenic standard. No application or storage of herbicides, pesticides, or other chemicals is allowed within 50 feet of a public water system well. Limiting the use of the road that passes within 50 feet of Well #5 may need to be considered to avoid contamination from chemical spills or releases occurring on the road. If microbial contamination becomes a problem, appropriate disinfection practices would need to be maintained for the system. Furthermore, the disinfection system should be modified and monitored to avoid further detections of VOCs in the drinking water. Though water cannot be totally free of by-products when disinfection is used, they can be reduced by treatment modifications. To reduce the amount of trihalomethanes detected in the water system, EPA suggests moving the point of chlorination after the coagulation and settling steps of the treatment train to reduce the amount of natural organic matter (NOM). Other factors that affect the formation of by-products are pH, temperature, and dose of disinfection. For more control strategies and disinfection by-products information, see www.epa.gov/safewater/mdbp/pdf/alter/chapt_2.pdf. Since the delineations underlie urban and residential land, storm water drainage may be a consideration. Much of the designated protection areas are outside the direct jurisdiction of the City of Kuna, making collaboration and partnerships with state and local agencies and industry groups critical to the success of drinking water protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineations contain some urban and residential land uses. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the U.S. Environmental Protection Agency. As there are transportation corridors through the delineations, the Idaho Department of Transportation should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the Ada Soil and Water Conservation District, and the Natural Resources Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Boise Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Boise Regional DEQ Office	(208) 373-0550
State DEQ Office	(208) 373-0502

Website: http://www2.state.id.us/deq

Water suppliers serving fewer than 10,000 persons may contact John Bokor, Idaho Rural Water Association, at 1-800-962-3257 for assistance with wellhead protection strategies.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund≅ is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

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Appendix A

City of Kuna
Potential Contaminant Inventories
and Delineated Areas
Tables 2, 3, and 4
Figures 2, 3, and 4

Table 2. City of Kuna Well #3, Potential Contaminant Inventory

SITE #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
1, 2	LUST – Site Cleanup Completed, Impact Unknown; UST - Open	0 – 3	Database Search	VOC, SOC
	Highway 69	3 – 6	GIS Map	IOC, VOC, SOC

[1] LUST = leaking underground storage tank, UST = underground storage tank
[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table 3. City of Kuna Well #4, Potential Contaminant Inventory

SITE #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
1	UST – Closed	0 – 3	Database Search	VOC, SOC
2	CERCLA Site	0 – 3	Database Search	IOC, VOC, SOC
	Indian Creek	0 – 3	GIS Map	IOC, VOC, SOC, Microbials
	Highway 69	6 – 10	GIS Map	IOC, VOC, SOC

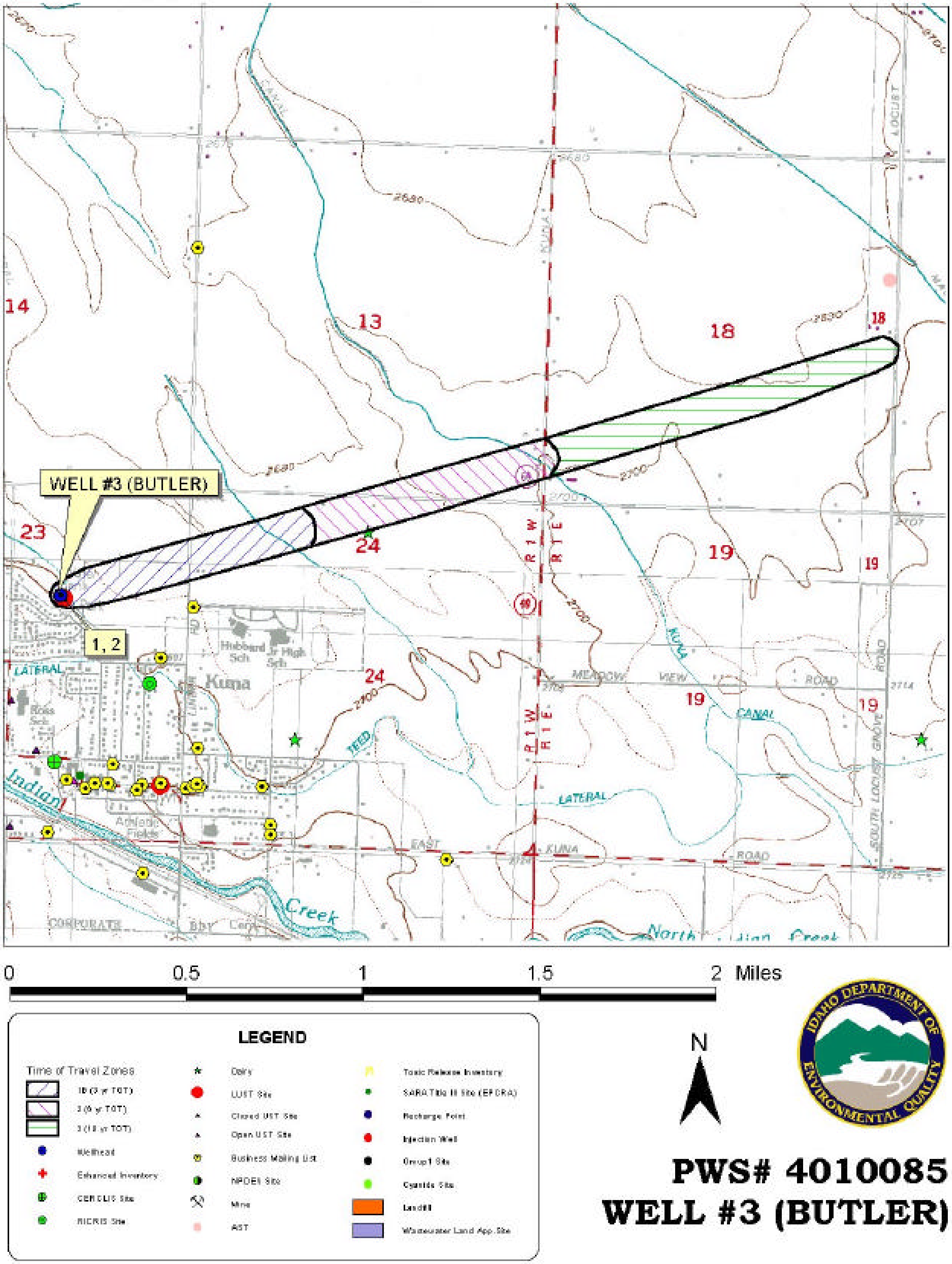
[1] TRI = toxic release inventory, UST = underground storage tank, CERCLA = Comprehensive Environmental Response Compensation and Liability Act
[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table 4. City of Kuna Well #5, Potential Contaminant Inventory

SITE #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
	Ten Mile Road	0 – 3	GIS Map	IOC, VOC, SOC, Microbials
	Highway 69	0 – 3	Database Search	IOC, VOC, SOC, Microbials

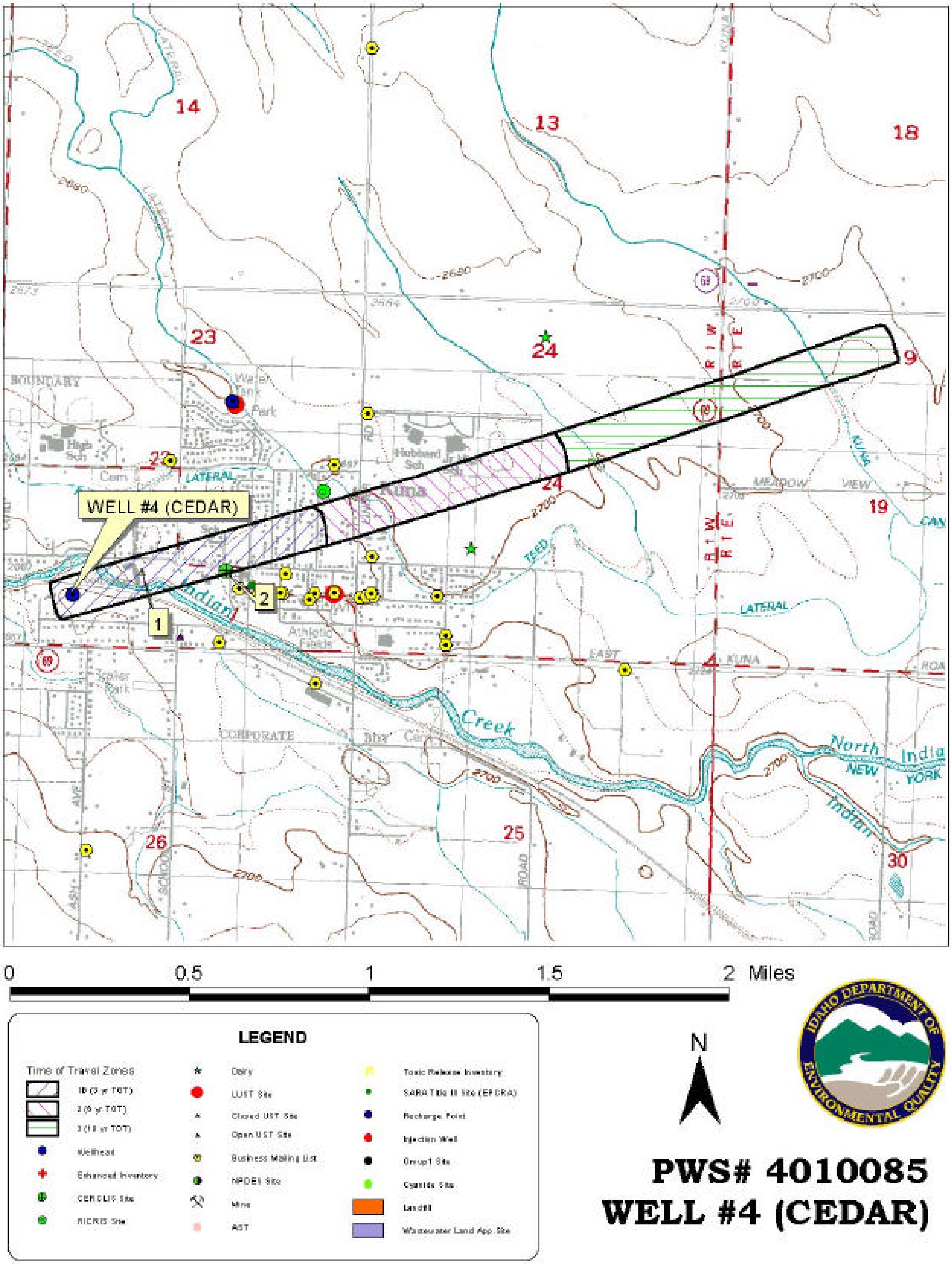
[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Figure 2. City of Kuna Delineation Map and Potential Contaminant Sources



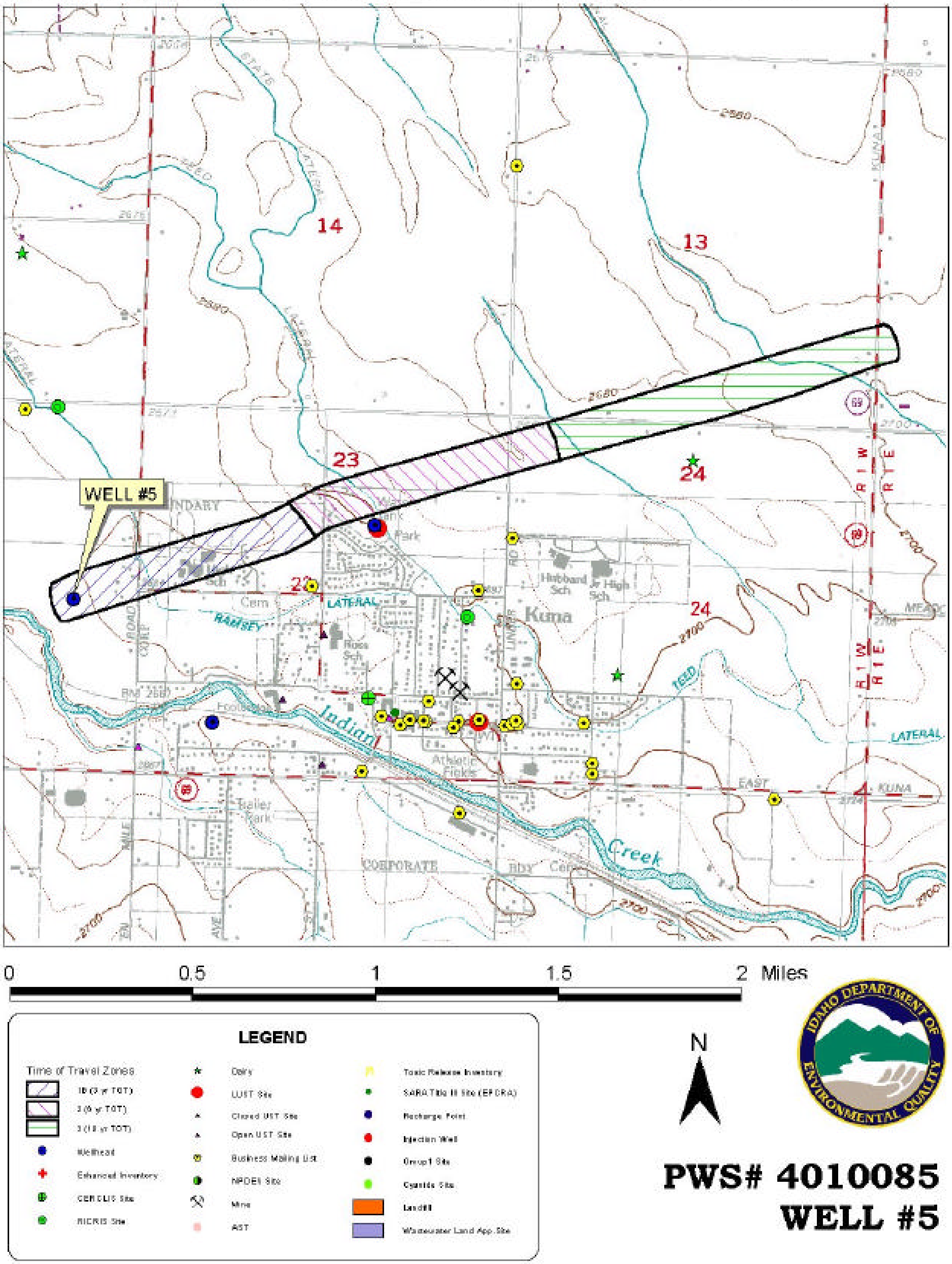
PWS# 4010085
WELL #3 (BUTLER)

Figure 3. City of Kuna Delineation Map and Potential Contaminant Sources



PWS# 4010085
WELL #4 (CEDAR)

Figure 4. City of Kuna Delineation Map and Potential Contaminant Sources



PWS# 4010085
WELL #5

Appendix B

City of Kuna
Susceptibility Analysis
Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) 2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report

Public Water System Name : KUNA CITY OF

Public Water System Number 4010085

Well# : WELL #3(BUTLER)

11/28/2001 9:31:49 AM

1. System Construction		SCORE			
Drill Date	1/1/1976				
Driller Log Available	YES				
Sanitary Survey (if yes, indicate date of last survey)	YES	1994			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	YES	0			
Well located outside the 100 year flood plain	YES	0			
	Total System Construction Score	3			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	YES	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	NO	2			
	Total Hydrologic Score	6			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
	Total Potential Contaminant Source/Land Use Score - Zone 1A	2	2	2	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	1	2	2	1
(Score = # Sources X 2) 8 Points Maximum		2	4	4	2
Sources of Class II or III leacheable contaminants or	YES	5	2	2	
4 Points Maximum		4	2	2	
Zone 1B contains or intercepts a Group 1 Area	YES	0	0	2	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
	Total Potential Contaminant Source / Land Use Score - Zone 1B	10	10	12	6
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
	Potential Contaminant Source / Land Use Score - Zone II	5	5	5	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
	Total Potential Contaminant Source / Land Use Score - Zone III	1	1	1	0
Cumulative Potential Contaminant / Land Use Score		18	18	20	8
4. Final Susceptibility Source Score		13	13	13	12
5. Final Well Ranking		High	High	High	Moderate

Ground Water Susceptibility Report   Public Water System Name : KUNA CITY OF   Well# : WELL #4(CEDAR)

Public Water System Number 4010085   11/28/2001 9:32:33 AM

1. System Construction		SCORE
Drill Date	8/18/1993	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES	1994
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	YES	0
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		3

2. Hydrologic Sensitivity		
Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	YES	0
Total Hydrologic Score		4

3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	URBAN/COMMERCIAL	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	2	3	3	1
(Score = # Sources X 2) 8 Points Maximum		4	6	6	2
Sources of Class II or III leacheable contaminants or	YES	2	3	3	
4 Points Maximum		2	3	3	
Zone 1B contains or intercepts a Group 1 Area	YES	0	0	2	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		6	9	11	2
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		2	2	2	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		3	3	3	0
Cumulative Potential Contaminant / Land Use Score		13	16	18	4
4. Final Susceptibility Source Score		10	10	11	9
5. Final Well Ranking		Moderate	Moderate	Moderate	Moderate

Ground Water Susceptibility Report   Public Water System Name : KUNA CITY OF   Well# : WELL #5
Public Water System Number 4010085   11/28/2001 9:33:02 AM

1. System Construction		SCORE			
Drill Date	7/1/1998				
Driller Log Available	YES				
Sanitary Survey (if yes, indicate date of last survey)	YES	1994			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	YES	0			
Well located outside the 100 year flood plain	YES	0			
	Total System Construction Score	3			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	YES	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	YES	0			
	Total Hydrologic Score	4			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	YES	YES	YES
	Total Potential Contaminant Source/Land Use Score - Zone 1A	2	2	2	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	1	1	1	1
(Score = # Sources X 2) 8 Points Maximum		2	2	2	2
Sources of Class II or III leacheable contaminants or	YES	5	1	1	
4 Points Maximum		4	1	1	
Zone 1B contains or intercepts a Group 1 Area	YES	0	0	2	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
	Total Potential Contaminant Source / Land Use Score - Zone 1B	10	7	9	6
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
	Potential Contaminant Source / Land Use Score - Zone II	2	2	2	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
	Total Potential Contaminant Source / Land Use Score - Zone III	3	3	3	0
Cumulative Potential Contaminant / Land Use Score		17	14	16	8
4. Final Susceptibility Source Score		10	10	10	10
5. Final Well Ranking		High	High	High	High